Journal of Pediatric Endoscopic Surgery
https://doi.org/10.1007/s42804-020-00079-1

SHORT COMMUNICATION

Exclusive use of Veress needle for pediatric laparoscopy: an 18 year experience

Amar Shah[1] · **Anirudh Shah**[1]

Received: 30 June 2020 / Revised: 26 July 2020 / Accepted: 8 August 2020

Abstract

Objective Establishment of pneumoperitoneum is the key to perform laparoscopic surgery. The safety profile of the Veress needle has always been questioned over the years. We share our experience with the exclusive use of Veress needle in consecutive 2631 patients for pediatric laparoscopy over the past 18 years.

Method Pneumoperitoneum was created in all the 2631 children undergoing laparoscopy for various etiologies. The age ranged from 1 day to 18 years. All the procedures were performed by either of the authors. Feasibility of the procedure and complications were recorded.

Results Pneumoperitoneum was safely created by the use of Veress needle in all the patients. Of these, 18 children had omental insufflation and 10 children had pre-peritoneal insufflation. One child had bowel injury. There were no incidences of vascular injury or air embolism in this patient population. There was no mortality.

Conclusion The use of Veress needle for establishing pediatric pneumoperitoneum is safe in children of all ages if protocols are strictly followed.

Keywords Veress needle · Pediatric · Laparoscopy · Pneumoperitoneum

Introduction

Minimal access pediatric surgery has made remarkable progress over the past 2 decades. It is now the gold standard for tackling many pediatric surgical problems. Creation of pnemoperitoneum is a must for any laparoscopic procedure. Most of the complications that arise from laparoscopy are related to this first and most important step. Almost every kind of intra-abdominal organ and vascular injury has been reported worldwide in adults [1]. Further to this, the safety profile of the Veress needle has always been questioned. Many other techniques and modifications have developed and advocated by multiple centres across the world [2, 3]. However, none of these techniques are totally free of complications.

✉ Amar Shah
shahamar22@gmail.com

[1] Amardeep Multispeciality Children Hospital and Research Centre, 65, Pritamnagar Society, Near Government Ladies Hostel, Near Gujarat College, Ellisbridge, Ahmedabad 380006, India

Methods

Veress needle was used in all neonatal and pediatric patients undergoing laparoscopy over the past 18 years. It was used for all planned and emergency procedures and for all primary and redo surgeries. The disposable Veress needle was used in all the procedures. Three main sites were used for insertion of the Veress needle: umbilical, median supra umbilical and left subcostal. The umbilicus was the most commonly used site. The median supra umbilical site was used in small children undergoing operative procedures in the pelvis. The left subcostal placement was done for patients with previous surgeries or when peritoneal insufflation was not successful using the other two sites.

The needle was placed at a right angle to the skin and then readjusted towards the sacral hollow. The angle of the needle was routinely kept around 45°. However, in obese children, the angle was increased to anywhere between 45° and 90°. A sharp click was heard no sooner the needle entered the peritoneum. A hanging drop test and aspiration were done to confirm intra-peritoneal placement in all cases. A maximum of two attempts were made to create pneumoperitoneum from a single site. When unsatisfactory, the site of

Published online: 17 August 2020

needle insertion was changed. Insufflation was commenced at 0.5 L/min and increased gradually to 1 L/min once pneumoperitoneum commenced.

Results

A total of 2631 children underwent laparoscopy for planned and emergency indications. 1887 were males and 744 were females. 127 were neonates, 1112 children were < 2 years old, 399 were between 2 and 5 years, 517 were between 5 and 10 years, 383 were between 10–15 years and 93 were between 15 and 18 years old. The surgical indications and patient demographics have been recorded and tabulated (Table 1). Pneumoperitoneum was successfully created using Veress needle in all patients. There were 28 minor (1.06%) and 1 major complications (0.04%). Minor complications included omental insufflation in 18 (0.7%) children and pre-peritoneal insufflation in 10 (0.4%) children. One child had bowel injury. There was no vascular injury, air embolism or mortality.

Discussion

The debate regarding the best method of achieving pneumoperitoneum has been going on since the start of laparoscopy. Access to the peritoneum can be achieved either by a minilaparotomy and insertion of Hasson's trocar, blind insertion of optical trocar or by Veress needle. Although Veress needle is the commonly used, however many surgeons are weary of using it following reports of life threatening complications [4].

We have used Veress needle for peritoneal insufflation for all neonatal and pediatric laparoscopies and also in children who had undergone previous laparotomies and laparoscopies. The rate of abdominal wall adhesions varies from 0 to 0.68% in patients without previous abdominal surgery, up to 15% with previous laparoscopy and anywhere between 20 to 60% in those with previous abdominal surgery. [5] In our series, we used the left hypochondrium as the entry point of the Veress needle in all children who had a previous operative procedure on the abdomen. In these children we always use a blunt trocar for insertion of the first port as an additional safety manoeuvre.

Pre-peritoneal placement of the Veress needle can cause extraperitoneal insufflation which may lead to subcutaneous emphysema making eventual placement of trocars much more difficult. If unnoticed, this may lead to abandonment of the laparoscopic procedure [6]. In our series, we encountered pre-peritoneal insufflation in ten patients. All these were obese teenagers and during the early years of our practice. However, this issue was recognized and the needle was reinserted in a different angle and successful peritoneal insufflation established. Over the years, we increased the angle of insertion of the Veress needle in these obese children. Yanke et al. also reported about safe introduction of Veress needle excepting some preperitonial insufflation (7%) and without the need for any forced open conversion or any vascular/visceral injuries. [7].

18 patients in our series had omental insufflation. This was seen in children undergoing laparoscopy for an inflammatory pathology like acute perforated appendicitis or appendicular lump. Here the omentum is spread out across the entire abdomen trying to contain the inflammatory process and hence adhered to parietal peritoneum. The Veress needle goes through this thin omental layer causing omental insufflation. This can be seen on insertion of the first trocar. This however does not hamper the operative procedure in any way. The omentum can be teased off the parietal peritoneum using the telescope or an instrument after placement of the second trocar. This deflates the 'omental air ball' and the operative procedure can be carried out as planned.

Gas embolism is a rare and fatal complication due to accidental puncture and insufflation into a vessel by the Veress needle. This is recognized by a sudden drop in end tidal CO_2 and blood pressure. Reports of air embolism have been found more in adults [8]. We have not encountered any episode in our series even in neonates.

We had one incidence of bowel injury in our series. The child had rectosigmoid Hirschsprung's disease and had undergone a right transverse colostomy before. During insufflation for the laparoscopic pull through procedure, the Veress needle accidentally went through the left transverse colon which was adhered to the abdominal wall. The injury was picked up following insertion of the first trocar. However, the injury being in the distal colonic loop, it did not have any impact on the surgical outcome, time of discharge or morbidity. The procedure was carried out laparoscopically as planned along with an omentopexy over the site of the colonic puncture.

We believe that a suboptimal Veress needle is the main reason for complications. Repeated use of the reusable Veress needle causes it to be blunt, makes the spring action defective and causes leaks. One should always remember that the reusable Veress needle is not a lifetime investment. If care and caution are exercised, Veress needle is a very good instrument for creation of pneumoperitoneum in children.

Very few articles in literature have compared different insufflation techniques for pediatric laparoscopy. Ours is perhaps the largest series of exclusively using Veress needle for creating pneumoperitoneum in children. Watson et al. [9] compared the laparoscopic entry techniques in adults and concluded that the overall evidence was insufficient to support the use of one entry technique over another. They

Table 1 Surgical indications and patient demographics

Sr. no	Diagnosis	Number	Male	Female	Neonates	<2 years	2–5 years	5—10 years	10–15 years	15–18 years
1	Abdominal Cysts/Masses	108	45	63	7	88	13	0	0	0
2	Appendicitis	900	568	332	0	0	124	432	281	63
3	Cholecystectomy	60	24	36	0	0	0	18	32	10
4	Diagnostic Laparoscopy	80	52	28	0	0	6	22	37	15
5	Anorectal Malformation	30	30	0	0	30	0	0	0	0
6	Inguinal Hernias	243	167	76	28	146	69	0	0	0
7	Impalpable Testis	435	435	0	0	383	45	7	0	0
8	Direct Hyperbilirubinemia	100	63	37	0	100	0	0	0	0
9	Fundoplication for G.E.R.D.	15	12	3	0	0	15	0	0	0
10	Pull through for Hirschsprung's Disease	163	120	43	26	119	18	0	0	0
11	Hydatid cyst of Liver	14	12	2	0	0	10	4	0	0
12	Hystrectomy	2	0	2	0	0	0	0	0	2
13	Intestinal Obstruction	39	28	11	0	4	23	9	3	0
14	Intussusception	143	112	31	0	119	24	0	0	0
15	Ovarian Cysts	54	0	54	33	9	7	5	0	0
16	Varicocele	23	23	0	0	0	0	0	20	3
17	Liver Abscess	28	19	9	0	9	14	5	0	0
18	Meckel's Diverticulum	34	28	6	0	0	23	11	0	0
19	Pyloric Stenosis	47	46	1	3	44	0	0	0	0
20	Spleenectomy	12	10	2	0	0	0	4	8	0
21	Vitellointestinal duct Remnants	57	55	2	10	44	3	0	0	0
22	Disorders of Sexual Differentiation	39	33	6	20	17	0	0	2	0
23	Enteric Perforation	5	5	0	0	0	5	0	0	0
	Total	2631	1887	744	127	1112	399	517	383	93

however did show an advantage of direct trocar entry over Veress needle for failed entry.

Conclusion

Proper evaluation of the patient supported by surgical skills and good knowledge of technology and instrumentation is the key to safe access and prevention of complications in pediatric laparoscopy. Even though it may be a blind procedure, the use of Veress needle in pediatrics is easy and safe. The risk or vascular and visceral injury is more if adequate care is not taken.

References

1. Cakir T, Tuney D, Esmaeilzadem S, Aktan AO (2006) Safe Veress needle insertion. J Hepatobiliary Pancreat Surg 13(3):225–227
2. Kaistha S, Kumar A, Gangavatiker R, Br S, Sisodiya N (2019) Laparoscopic access: direct trocar insertion versus open technique. J Laparoendosc Adv Surg Tech A. 29(4):489–494
3. Günenç MZ, Yesildaglar N, Bingöl B, Onalan G, Tabak S, Gökmen B (2005) The safety and efficacy of direct trocar insertion with elevation of the rectus sheath instead of the skin for pneumoperitoneum. Surg Laparosc Endosc Percutan Tech. 15(2):80–81
4. Agresta F, De Simone P, Ciardo LF, Bedin N (2004) Direct trocar insertion vs Veress needle in nonobese patients undergoing laparoscopic procedures: a randomized prospective single-center study. Surg Endosc. 18(12):1778–1781
5. Vilos GA, Ternamian A, Dempster J, Laberge PY, Clinical Practice Gynaecology Committee (2007) Laparoscopic entry: a review of techniques, technologies, and complications. J Obstet Gynaecol Can. 29(5):433–447
6. Wind J, Cremers JE, van Berge Henegouwen MI, Gouma DJ, Jansen FW, Bemelman WA (2007) Medical liability insurance claims on entry-related complications in laparoscopy. Surg Endosc. 21(11):2094–2099
7. Yanke BV, Horowitz M (2007) Safety of the Veress needle in pediatric laparoscopy. J Endourol. 21(7):695–697
8. Neudecker J, Sauerland S, Neugebauer E, Bergamaschi R, Bonjer HJ, Cuschieri A, Fuchs KH, Jacobi Ch, Jansen FW, Koivusalo AM, Lacy A, McMahon MJ, Millat B, Schwenk W (2002) The European Association for Endoscopic Surgery clinical practice guideline on the pneumoperitoneum for laparoscopic surgery. Surg Endosc. 16(7):1121–1143
9. Ahmad G, Baker J, Finnerty J, Phillips K, Watson A (2019) Laparoscopic entry techniques. Cochrane Datab Syst Rev 18:1